



SPOT REPORT

POTENTIAL IMPACT OF HURRICANES IRMA AND MARIA ON DISEASE TRANSMISSION IN THE U.S. VIRGIN ISLANDS AND PUERTO RICO

29 September 2017

FEDERAL EDITION

Current Event Status (Undetermined)

In September 2017, two Category 5 Hurricanes with record-breaking wind speeds heavily impacted the Caribbean Islands; especially Anguilla, Antigua and Barbuda, the Bahamas, Cuba, Dominica, Guadeloupe, Martinique, Puerto Rico, Saint Martin, Sint Maarten, and the British and U.S. Virgin Islands. Flooding and high winds have resulted in complications with water and food supplies, sanitation, infrastructure, electricity, medical care, and mosquito control. As a result of the aforementioned issues, there is concern about increased risk of disease transmission in the area. Additionally, many Federal agencies are deploying relief workers to the U.S. Virgin Islands and Puerto Rico, and the U.S. Government seeks to protect people from contracting infectious diseases during response efforts.

Worsening

No Change

Improving

Undetermined

Why We Are Reporting on This Event

Following impact from Hurricanes Irma and Maria, there is concern regarding a potential increase in transmission of infectious diseases in the Caribbean Islands, affecting both the general population and the U.S. Federal Government personnel deployed to aid in response efforts. NBIC is closely monitoring areas recently impacted by hurricanes in anticipation of potential infectious disease outbreaks.

SITUATION OVERVIEW

On 12 September, the U.S. Centers for Disease Control and Prevention (CDC) issued a level 2 travel alert for the Caribbean; advising tourists to delay travel, and relief workers to practice enhanced precautions, especially against vector-borne diseases, including chikungunya, dengue and Zika viruses. Malaria is also of concern in Haiti and the Dominican Republic, but not in other hurricane-impacted islands where the disease has not circulated for decades.^{1,2} In Puerto Rico, specifically, locally-acquired cases of malaria have not been reported since 1955³. Humanitarian aid and disaster relief workers traveling overseas may be more exposed to circulating endemic diseases, and have less-secure lodgings compared to regular tourists, resulting in an increased health risk⁴. NBIC research identified the following specific infectious disease concerns for the impacted area, described in detail below.

Infectious Disease Concerns

Type	Example
Vaccine-Preventable Diseases	Routine vaccines, Cholera*, Hepatitis A, Hepatitis B, Influenza [§] , Rabies, Typhoid
Vector-borne Diseases	African tick-bite fever, Chikungunya*, Dengue, West Nile [#] , Zika
Waterborne Diseases	Leptospirosis*

Figure 1: Diseases of risk to travelers visiting the U.S. Virgin Islands and Puerto Rico, according to the CDC. *=Listed as endemic, or potentially endemic in EBSCOHealth's GIDEON (Global Infectious Disease and Epidemiology Network), and/or associated with flooding and infrastructure. #=Some evidence of presence, no known human or animal outbreaks to date.

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For questions, comments, or to receive this report, please contact NBICOHA@hq.dhs.gov

Vector-borne Diseases

Mosquito-borne Diseases

Chikungunya, dengue, and Zika viruses are endemic in the U.S. Virgin Islands and Puerto Rico. The CDC advises individuals exposed to chikungunya, dengue, or Zika viruses to protect themselves against mosquito bites for up to three weeks post exposure to prevent further spread.⁵ There is also some evidence of the presence of West Nile virus in Puerto Rico, particularly in animal populations, although noted outbreaks among human or animal populations have not been reported to date and it is not listed as a concern in the CDC's guidance noted above.^{6,7}

Adult mosquitoes in the outdoors usually do not survive hurricane-force winds. Young mosquitoes are likely to be washed away by flood waters, causing a temporary drop in mosquito populations.⁸ The debris and standing water left after a hurricane is likely to provide ample breeding grounds for surviving mosquitoes, meaning populations can spike within a few weeks of the event.⁹ A study of dengue transmission after Hurricane Georges showed the risk of acquiring dengue among relief workers appeared to be low, likely as a result of protective factors¹⁰. Relief workers should take precautions to prevent mosquito bites.^{11,12} Local residents can help control mosquito populations by removing breeding grounds.¹³

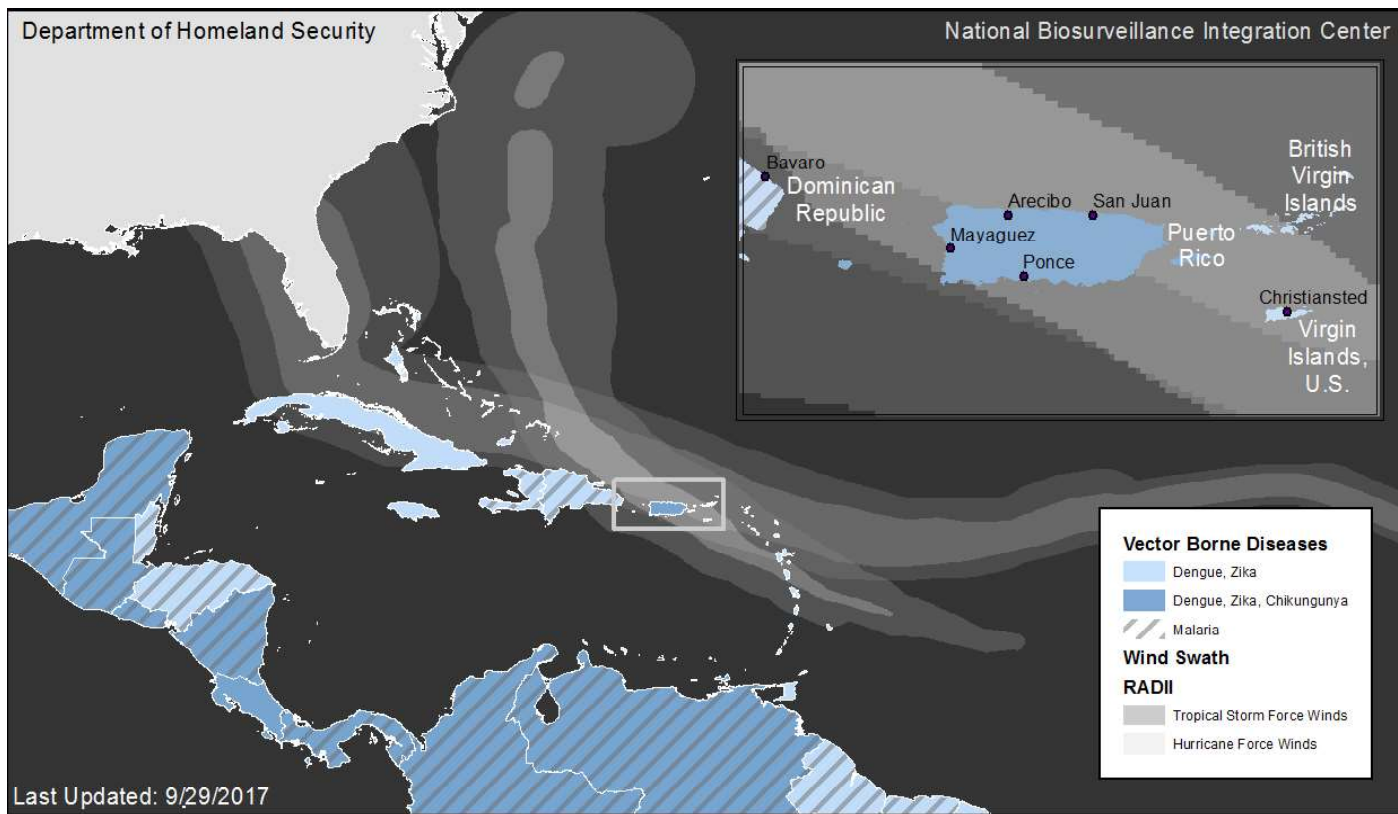


Figure 2: Map of countries with sustained local dengue, chikungunya, Zika, and/or malaria transmission in the previous year. Data for dengue¹⁴, chikungunya¹⁵, and Zika¹⁶ was obtained from the Pan American Health Organization (PAHO). Data for malaria was obtained from by the CDC¹⁷. Hurricane wind swaths provided by the National Oceanic and Atmospheric Administration (NOAA) National Hurricane Center¹⁸.

Tick-borne Diseases

African tick-bite fever is caused by infection with *Rickettsia africae* bacteria. In the Caribbean, the bacteria is transmitted by *Amblyomma variegatum* ticks, which are usually most active from November through April.^{19,20} Ruminants can serve as reservoirs of the bacteria. People working outside in wooded, brushy, or grassy areas are at higher risk of infection. *Amblyomma variegatum* ticks are not present in the continental United States.²¹

**Waterborne Diseases*****Cholera***

Cholera is naturally occurring in fresh and brackish water. In the U.S. Virgin Islands and Puerto Rico, cholera was common in the 1800s, prior to the creation of modern water and sewage treatment systems. These areas have not recorded locally-acquired cases of cholera since the 1800s²². A study published in 1989 found *Vibrio cholera* bacteria in the Mameyes River, on the northeastern coast of Puerto Rico.²³ The study does not specify if the cholera recovered was toxigenic. Sporadic cases are currently reported among travelers to cholera-affected countries. Cholera outbreaks, however, are often associated with flooding and infrastructure damage, which allow for increased fecal contamination of water supplies.

A single-dose oral cholera vaccine is licensed and available in the U.S. The vaccine is recommended for travelers to an area of active cholera transmission, and not for those traveling to areas where sporadic cases have been reported²⁴.

Leptospirosis

Leptospirosis is a known occupational risk for people who work outside or with animals. The bacteria is spread through the urine of infected wild and domestic animals and can contaminate water or soil and survive there for weeks to months.^{25,26} A study evaluating the risk of leptospirosis in Puerto Rico found an increased number of leptospirosis cases after Hurricane Hortense in 1966.²⁷ From 2000-2009, approximately 15-100 suspected human cases of leptospirosis were reported per year in Puerto Rico.²⁸ A seroprevalence study of leptospirosis in small ruminants on St. Croix in the U.S. Virgin Islands showed 26-32% seroprevalence, indicating the bacteria is still present on the island.²⁹

¹ Centers for Disease Control and Prevention. 2017. "Hurricanes Irma and Maria in the Caribbean."

<https://wwwnc.cdc.gov/travel/notices/alert/hurricane-irma-in-the-caribbean>

² WHO. 2008. "Malaria eradication back on the table." <http://www.who.int/bulletin/volumes/86/2/07-050633/en/>

³ EBSCOHealth GIDEON. 2017. "Puerto Rico."

<https://www.gideononline.com/>



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- ⁵ Centers For disease Control and Prevention. 2016. "Key Zika Considerations for Healthcare Settings." <https://www.cdc.gov/zika/pdfs/key-zika-considerations.pdf>
- ⁶ EBSCOHealth GIDEON, 2017. "Puerto Rico."
- ⁷ Emerging Infectious Diseases. 2009. "West Nile Virus from Blood Donors, Vertebrates, and Mosquitoes, Puerto Rico, 2007." <https://wwwnc.cdc.gov/eid/article/15/8/pdfs/09-0333.pdf>
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- ²⁰ Centers for Disease Control and Prevention. 2013. "African Tick-bite Fever." <https://wwwnc.cdc.gov/travel/diseases/african-tick-bite-fever>
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